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Autologous deep vein reconstruction of infected thoracoabdominal aortic patch graft

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Graft infection remains a serious complication of prosthetic aortic repair. Infection of thoracoabdominal aortic prosthetic grafts, in particular, is a significant clinical challenge and is associated with high mortality. We report successful in situ reconstruction of an infected thoracoabdominal aortic prosthetic patch graft with autogenous superficial femoral vein. To our knowledge, this is the first such case described in the North American and English language surgical literature. At 24-month follow-up the patient remains well, with no evidence of sepsis or graft complication at clinical and radiologic assessment. (J Vasc Surg 2003;38:852-4.)

Graft infection is a serious complication of prosthetic aortic repair. Mortality rates after thoracic aortic graft sepsis may be as high as 75%.[1] The established principles of surgical treatment in prosthetic aortic graft infection entail eradication of sepsis with removal of infected graft followed by revascularization. However, in the management of thoracoabdominal graft infection, blood flow to the visceral and spinal vessels and to the lower extremities must be maintained, thus mandating in situ reconstruction.

We report the successful replacement of an infected thoracoabdominal prosthetic aortic patch graft with in situ autologous superficial femoral vein.

CASE REPORT

A previously fit 23-year-old white man was referred to our vascular surgical service with mid-aortic syndrome, identified during investigation for hypertension. Aortograms demonstrated stenosis of the visceral aorta commencing at the level of the celiac axis and extending to just below the renal arteries. A decision was made to proceed with patch angioplasty of the lesion.

Through a left thoracolaparotomy, transperitoneal medial visceral rotation was performed, enabling access to the visceral aorta. Stenosis extending from the origin of the celiac artery to the renal arteries was confirmed. After mobilizing the vessels and administering 5000 units of intravenous heparin, supraceliac and infrarenal aortic clamps were applied. The area of aortic stenosis was opened, and visceral artery backbleeding was controlled with balloon occlusion catheters. Patch angioplasty was undertaken with a knitted Dacron graft (Sulzer Vascutek, Inchinnan, Scotland) and 3/0 polypropylene sutures. The viscera and lower limbs were reperfused sequentially. Postoperatively the patient was transferred to the intensive care unit for 24 hours. Recovery was unremarkable, and the patient was discharged to home 10 days after surgery.

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Three months later the patient returned with systemic malaise and rigors. Clinical examination revealed fever, with a soft abdomen and well-healed wound. White blood cell count was normal, although C-reactive protein was elevated at 126 mg/L. Blood cultures revealed methicillin-sensitive *Staphylococcus aureus* bacteremia. Parenteral vancomycin and flucloxacillin therapy was started. At contrast material–enhanced computed tomography and aortography, a periaortic graft pseudoaneurysm was identified adjacent to the proximal anastomosis (Figs 1, 2). Aortic graft infection was diagnosed, and it was decided to perform radical graft excision together with autologous vein reconstruction.

At operation, long saphenous vein was harvested from the right leg and found to be of narrow caliber. Superficial femoral vein was thus harvested from the left leg, from the level of the profunda vein to the distal third of the thigh. Thereafter, repeat thoracolaparotomy with transperitoneal medial visceral rotation enabled access to the visceral aorta. An inflammatory mass was identified at the site of the previous aortic repair. After intravenous administration of 3000 units of heparin, supraceliac and infrarenal aortic clamps were applied. The inflammatory mass was opened, enabling entry into the pseudoaneurysm cavity, and frank pus was expressed. The visceral and renal arteries were controlled with balloon occlusion catheters. The existing Dacron patch and involved aortic wall were excised, and the para-aortic tissues were widely debrided, leaving an aortic defect 2 × 6 cm and incorporating 60% of the aortic circumference. The infected field was irrigated with 1 g of rifampicin. The superficial femoral vein graft was opened longitudinally and sutured to the freshened edges of the aorta with 3/0 polypropylene sutures. Postoperatively the patient was transferred to the intensive care unit for 24 hours. Microbiological examination of debrided tissue specimens revealed pus cells but no growth on culture. Parenteral antibiotic therapy was continued for 2 weeks after operation. Thereafter, oral flucloxacillin was administered. Recovery was complicated by *Escherichia coli* urinary tract infection, which was treated with oral ciprofloxacin. The patient was discharged from the hospital 11 days after the operation, with continued oral flucloxacillin therapy.

At 24-month follow-up the patient remained clinically asymptomatic, and has had no long-term lower limb complications. Inflammatory markers have returned to normal, and repeat computed tomography scans demonstrate an intact repair with no evidence of graft complication (Fig 3).

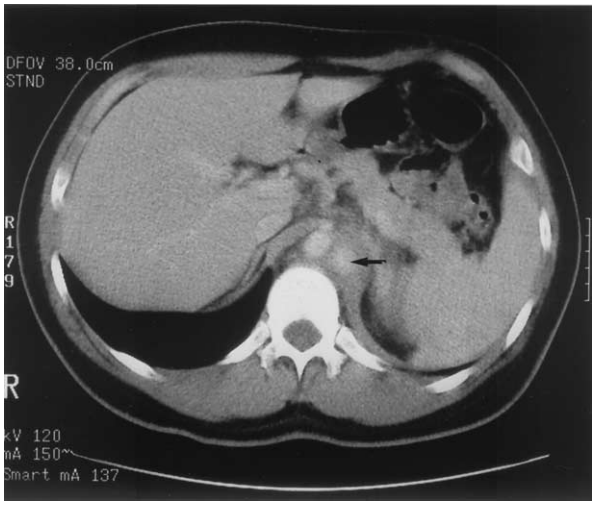

Fig 1. Preoperative computed tomography scan shows aortic pseudoaneurysm (*arrow*).

Fig 2. Preoperative aortogram shows pseudoaneurysm at proximal graft anastomosis.

DISCUSSION

Svensson et al[2] in their review of 1509 thoracoabdominal aortic operations reported an incidence of prosthetic graft infection of about 1.7%. The gravity of such a complication is illustrated by Crawford's series of 13 patients with infected thoracoabdominal graft infection, of whom 11 died as a consequence of graft sepsis.[3]

Fig 3. Computed tomography scan at 12 months demonstrates normal caliber aorta.

The traditional management of aortic graft infection has entailed radical resection of the graft, together with extra-anatomic bypass. Such an approach is associated with high mortality, prolonged hospital stay, repeat operation, and a significant rate of limb loss.[4] Thoracoabdominal graft infection generally demands in situ revascularization or preservation of an existing infected graft to maintain visceral and spinal arterial inflow.[5] However, in situ prosthetic graft reconstruction within a previously infected field or preservation of an infected graft is associated with considerable risk for recurrent graft sepsis. To reduce this risk, use of biological grafts for in situ reconstruction has been advocated. Previous reports have documented successful management of thoracoabdominal aortic graft infection with arterial autografts and allografts.[5,6] Only anecdotal reports of the former approach exist, and demand sacrificing a "donor" arterial segment, together with complex reconstruction. Greater experience exists with use of cryopreserved aortic allografts for treatment of thoracic aortic graft infection. Nonetheless, the risk for late graft rupture and infection associated with this technique does not justify its preferential use in prosthetic aortic graft sepsis.[7]

Autologous deep veins for arterial reconstruction have been used successfully in infrarenal abdominal aortic prosthetic graft infection, with an associated mortality rate of only 7% to 10%.[8,9] However, use of such a technique in management of thoracoabdominal aortic graft infection has not previously been described. Superficial femoral vein confers all the benefits of an autogenous biologic graft while remaining easy to harvest and reconstruct as an arterial conduit. Theoretical concerns regarding risk for late graft infection and aneurysm change have been raised. However, Clagett et al,[9] in their review of 41 patients with deep vein aortoiliac or femoral reconstructions, failed to identify any such problems. Furthermore, Wells et al[10] demonstrated minimal mid-term to late-term lower extremity venous morbidity despite outflow obstruction after superficial femoropopliteal vein harvesting.

Our patient's relative youth, and preservation of a portion of the native thoarcoabdominal aorta no doubt contributed to successful management. Nevertheless, thoracoabdominal aortic graft infection remains a complex problem. Where feasible, graft excision and arterial reconstruction should be the recommended treatment strategy. Autologous deep vein is a useful arterial conduit for attainment of these goals. Although regular radiologic surveillance, together with antibiotic prophylaxis, is recommended and long-term follow-up is lacking, early results are cause for optimism.

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